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CLAIMS

1. A wearable modular interface strap device comprising:
5 a plurality of mechanical and electrical interface docking points arranged around a flexible strap capable of supporting a plurality of removable modules;
a clasp to close and fasten the overall device as a loop such that it can be worn on the person;

10 a connector embedded within the clasp for allowing at least one of a power and data connection to be made to the device; and,

a plurality of wires which electrically connect each of the said docking points to the connector and circuitry to enable data communication between the connector, circuitry, docking points and attached modules;

15 the docking points providing a mechanical mechanism to enable modules to be attached and locked, and removed, without opening the strap, and an electrical mechanism and circuitry to enable power and data connectivity with an attached module such that said attached module can be removed or attached without electrical disruption to other modules.

2. A device according to claim 1, wherein said strap is arranged as a wristband
20 supporting the plurality of mechanical and electrical docking points and suitable to be worn as a loop on a wrist and being capable of being connected to an external device by means of the connector when the strap is open.

3. A device according to claim 1 or claim 2, wherein said strap supports at least one
25 earpiece and at least one microphone suitable for the overall device to be used for communication purposes.

4. A device according to claim 3, constructed and arranged so as to be usable for
communication purposes when being worn on the wrist.

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5. A device according to claim 3, constructed and arranged so as to be usable for communication purposes when being open and deployed as a handset.

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6. A device according to any of claims 3 to 5, and at least one removable control module with a display and an interface, at least one removable audio-enabled module, and at least one removable connectivity module, suitable for the overall device to be used for Voice-Over-IP and/or mobile communication.

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7. A device according to any of claims 3 to 6, and at least one removable module that provides a demountable earpiece that connects using a wireless link to the strap.

8. A device according to claim 7, wherein said demountable earpiece comprises an encased wireless connectivity chip and battery unit, and a collapsible sprung earplug that is arranged to fold out as the earplug unit is removed from said module and can be re-collapsed by the action of re-attaching the earpiece to said module.

9. A device according to claim 7 or claim 8, wherein said earpiece is formed from a flexible elastic or bi-stable material that is biased towards a preferred curved deployed form that is suited to being used within an ear, and a generally planar form when stored within said module.

10. A device according to any of claims 3 to 9, wherein a demountable wireless microphone is provided with an encased wireless connectivity chip and battery unit that can be stored on a module when not deployed.

11. A device according to any of claims 3 to 10, and a connectivity module that uses a sensor and display to indicate general electromagnetic signal strengths across frequencies for mobile connectivity.

12. A device according to any of claims 3 to 11, and a removable central control unit module that enables selection between available connectivity sources, and provides suitable Voice-Over-IP, GSM, GPRS or 3G codec processing to manage packet based voice communication between the device and a base-station and to provide audio feeds to a microphone and speaker located on strap modules, or via USB or Bluetooth wireless connectivity to local wireless audio devices.

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13. A device according to any of claims 3 to 12, and a health sensor module where data is recorded and transmitted wirelessly via a removable wireless module to enable health monitoring and alerts.

5 14. A device according to claim 1, wherein said strap is arranged as a modular necklace comprising a tubular flexible strap supporting the plurality of docking points and suitable to be worn as a loop around a neck and secured by means of the clasp at each end.

10 15. A device according to any of claims 1 to 14, wherein said electrical interface at a docking point is a serial bus interface comprising at least four metal prongs for power, ground, data and clock line connection between wires in the strap and a module connected to the docking point.

15 16. A device according to any of claims 1 to 15, wherein said overall device can act as a hub when open and connected via said connector for the purposes of recharging and data-exchange with an external host device, by means of control circuitry in the clasp, and local control circuitry attached to each docking point.

20 17. A device according to any of claims 1 to 16, wherein said overall device can act as a local network when not attached to an external device for the purposes of data-exchange and for access to resources on modules attached to other docking points on the strap, by means of host control circuitry in the clasp and local power management circuitry in the docking point and attached modules.

25 18. A device according to any of claims 1 to 17, wherein at least one docking point is assembled in layers comprising a circuit board electronically connected to a wire membrane in the strap and a cover for encasing local circuitry, chip and capacitance, wherein said cover contains a vertical prong shaped to be suitable for mechanically connecting to an attached module.

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19. A device according to any of claims 1 to 18, wherein said strap is assembled in layers comprising: a flexible upper layer containing holes to support docking point circuit boards, a flexible interior membrane layer containing wires connecting to an external connector in the

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clasp and connecting to and supporting the docking point circuit boards, and a lower layer for sealing the whole unit as a strap.

20. A device according to any of claims 1 to 19, wherein said clasp comprises:

5 a male component comprising a lid, a universal serial bus connector, control circuitry and chips, and a lower base unit; and,

a female component comprising a hinged lid and lower base unit, wherein said female component contains a locking block for attaching to the strap at various points and thereby varying the strap length.

10 21. A device according to claim 20, wherein said clasp comprises a tongue on the male component and a lip or groove on the female component such that the male component can hook over the female component as the clasp is being connected and the hinged lid folds down, encases and secures the overall assembly.

15 22. A device according to any of claims 1 to 21, including at least one removable module that provides at least one function of battery power, information display, control circuitry, data storage, a user interface, external sensing, communication functions, and extendibility for further functionality.

20 23. A device according to claim 22, wherein mechanical locking means in at least one docking point and in the base of said module enable said module to be slid laterally and locked into position on the strap without removing the strap from the person, and to be released by pressing a sprung button attached to said mechanical locking means.

25 24. A device according to claim 23, wherein said mechanical locking means is provided by means of a locking bar in the module having an underside profile that matches a vertical prong profile on the docking point, wherein the module has a hole with adjacent locking rails that secure the vertical prong when the module hole is positioned down over the vertical
30 prong and slid laterally, and wherein said sprung locking bar is arranged to be displaced by the action of positioning and sliding the module over the vertical prong and to spring back thereby locking the module in place.

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25. A device according to claim 24, wherein additional locking is provided by means of a sprung positioning pin or screw affixed to the module through holes in the strap.

26. A device according to any of claims 22 to 25, wherein the module comprises at least a locking mechanism suitable for connecting to the docking point, connector plates for
5 connecting to four metal serial bus connectors on the docking point when the module is attached, and a circuit board containing at least one chip.

27. A device according to any of claims 22 to 26, wherein the module is a combination
10 unit occupying two docking points on the strap, using at least one set of serial bus connectors, capable of being slid laterally into place as with a single module, and containing at least a display, interface device and control circuitry.

28. A device according to any of claims 22 to 26, wherein all modules are battery units
15 and at least one battery unit contains a wire for connecting to another wearable device such that the combination acts as a power-pack device.

29. A device according to any of claims 22 to 27, wherein at least one modular unit
20 provides wireless communication to allow any module on the strap to communicate wirelessly with an external device.

30. A device according to any of claims 1 to 29, and a docking station suitable for recharging the device and supporting additional electrically connected and spare modules.

31. A device according to any of claims 1 to 30, and at least one removable filler unit of
25 largely ornamental appearance serving to cover a docking point not being utilised by a module.

32. A device according to claim 31, wherein said filler unit has an interchangeable lid
30 capable of other style forms and capable of using the power lines and battery power within the strap for LED or electroluminescent or other light effects.

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33. A device arranged as a wristband and comprising a substantially flat and flexible strap supporting a plurality of mechanical and electrical interface docking points arranged around a flexible strap capable of supporting a plurality of removable modules, with a clasp locking means at each end to close and fasten the overall device as a loop such that it could be worn on the person, where said strap contains a plurality of wires which electrically connect each of the said docking points to an external connector embedded within the clasp and circuitry to enable data communication between docking points and attached modules, where said wristband can act as a hub for the attached modules when open and as a local network for connectivity between modules when closed, with said docking points providing a mechanical mechanism to enable said modules to be easily attached and locked, and removed laterally by means of a release mechanism without opening the strap, and said docking points providing a serial bus electrical mechanism and circuitry to enable power and data connectivity with an attached module such that it could be removed or attached without electrical disruption to other modules, where said modules are capable of providing a plurality of electrical device functions and includes at least one battery unit, at least one display unit, at least one interface unit, and at least one memory and control unit and could include at least one module filler unit acting to encase a docking point interface not in use by a module.

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